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A Decision-Analytic Aid for Collection and Allocation Planning (CAPS): User's Guide for the Apple II Plus Microcomputer

Battlefield Information Systems Technical Area

Systems Research Laboratory

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This manual describes an aid based on decision-analytic techniques for preparing the collection plan and allocating collection assets. Dealing with one essential element of information at a time, the aid will encourage the analyst to identify systematically and to rank specific information requirements and to allocate collection resources logically and optimally. The manual contains background rationale, computer instructions, a detailed description of the program, and a sample problem. It is intended for (Continued)

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use by intelligence analysts in field operation, tactical training, and academic instruction.   The aid is implemented on the Apple II microcomputer.   A version of these procedures modified for the HP41-C/HP41-CV hand-held calculator is also available.   *Keywords: Battlefield Information Systems*

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Research Product 84-22

A Decision–Analytic Aid for Collection and Allocation Planning (CAPS): User's Guide for the Apple II Plus Microcomputer

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The Battlefield Information Systems Technical Area is concerned with the demands of the future battlefield for increased user/system capacity to acquire, transmit, process, disseminate, and utilize information. Research is focused on user/system interface problems and interactions within command, control, and intelligence centers. Specific areas of concern are tactical symbology, user-oriented systems, information processing and management, and staff operations and procedures, as well as sensor systems integration and utilization.

One area of special interest is the development of procedures to support and enhance the decision-making process within command, control, and intelligence centers. This research product is a user's guide to an automated decision-analytic aid for development of the collection plan and allocation of collection resources. Use of these procedures is expected to maximize the tasking of limited collection resources to a vast array of collection requirements, as well as enhance communication and understanding between intelligence analysts and their commanders.

EDGAR M. JOHNSON
Technical Director

A DECISION-ANALYTIC AID FOR COLLECTION AND ALLOCATION PLANNING (CAPS):
USER'S GUIDE FOR THE APPLE II PLUS MICROCOMPUTER

EXECUTIVE SUMMARY
_____

Requirement:

   To develop a set of procedures that will encourage logical and systematic
collection planning and optimal tasking of collection resources.

Procedure:

   The aid is based on a combined study of the intelligence process and
decision-analytic techniques. General procedures for collection planning are
outlined within Army doctrine (FM 34-1). These procedures, however, do not
provide an explicit description of how to prepare actual plans. This aid has
been developed to supplement doctrine by providing a logical, systematic set
of procedures for creating collection plans.

Findings:

   The aid breaks the problem of collection planning into a series of logical
steps in which the analyst defines net intelligence needs and specific informa-
tion requirements. The analyst then establishes the priority of each specific
information requirement (SIR) by quantifying the likelihood of enemy action and
relevant indicators of that action, as well as the value of friendly responses
to enemy action in the given situation. Next, the analyst develops a tentative
allocation of resources by estimating the ability of specific resources to col-
lect data pertinent to each SIR. Finally, all of the analyst's evaluations are
combined by the computer to produce feedback regarding the usefulness of the
analyst's resource allocations.

Utilization of Findings:

   This user's guide contains complete background rationale for the aid and
computer instructions for the Apple II Plus microcomputer, as well as a de-
tailed reference section and sample problem. It is intended for use by intel-
ligence analysts in field operations, tactical training, and academic instruc-
tion. The aid will encourage the analyst to systematically identify and rank
specific information requirements and optimally allocate collection resources.
It is expected to provide a logical structure for preparing the collection plan
as well as enhance communication and mutual understanding between intelligence
analysts and their commanders.

A DECISION-ANALYTIC AID FOR COLLECTION AND ALLOCATION PLANNING (CAPS):
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INTRODUCTION

The Collection and Allocation Planning System (CAPS) aid described in the following sections is intended for use by intelligence analysts in developing the collection plan and tasking collection resources. The aid is designed to: (1) assist the analyst in identifying net intelligence needs and specific information requirements, (2) provide a logical structure for determining the priority of each information requirement, and (3) utilize this information in the systematic allocation of collection resources.

Army doctrine provides discussions about the collection of information (FM 34-1). However, doctrine does not provide detailed procedures for collection planning. The CAPS aid incorporates the traditional approach described in doctrine and extends it to include explicit procedures for steps which previously relied on intuition. These procedures involve attaching numerical estimates to various items in the plan. The estimates allow the user to determine the priority of intelligence requirements systematically. Establishing priority ensures that collection resources are allocated to those intelligence requirements that can provide the greatest contribution to the commander's decision.

Note that the aid will not provide the answers. It will assist in structuring the problem and provide feedback regarding the usefulness of proposed collection resource allocations.

The steps for using the CAPS aid follow.

Develop Plan:

1. The analyst defines net intelligence needs and specific information requirements.

2. The analyst estimates the probability of enemy action and the value of pertinent friendly action.

3. The computer assigns priority values to the specific information requirements based on the numerical input in step 2.

Allocate Resources:

4. The analyst evaluates the capability of collection resources to gather information that will answer the information requirements.

5. The computer generates a list of collection resources assigned to each information requirement with feedback regarding the usefulness of the resource allocations.

This user's guide contains four main sections. In the first section, the Apple II Plus equipment and operating instructions are discussed. The second section is an overview of CAPS procedure and menu layout. The third section, intended for the beginner, is a step-by-step example of the typical process of developing a collection plan. In the fourth section, intended to be used as a reference section, the various CAPS options are detailed.

As a beginner, you are encouraged not to dwell on details. Instead, after making certain that the equipment is set up properly, skim the second section to obtain a general understanding of CAPS. Then proceed to the third section to work through the example.

Although CAPS may appear complicated, it is not difficult to use when you have become familiar with it. You will seldom have to develop the collection plan from the beginning. Once you have entered the information in steps 1 and 2, you can save it for later reuse or updating. CAPS edit options permit you to modify previous inputs easily.

APPLE II PLUS EQUIPMENT AND OPERATING INSTRUCTIONS

Required Components

The Apple II Plus system consists of several components that must be properly interconnected. This section will allow you to verify that all the necessary elements are present and prope.ly connected, but it does not tell you <u>how</u> to hook up the system. If any internal connections (i.e., anything other than power cords) differ from the following, consult a qualified technician for assistance. Do not attempt to hook up the system because serious damage could result.

The following list includes all required and optional hardware elements:

Apple II Plus microcomputer
   with 48K bytes of memory
                       or Apple IIe
Apple Language Card
   with 16K bytes of memory

80-column card

Display/video monitor

Keyboard

2 disk drives

Printer (optional)

You will also need the two diskettes labeled CAPS 1 and CAPS 2. Figure 1 shows a typical Apple system, with a display, two disk drives, and a printer. Your set-up may look different because many different displays and printers can be used with the Apple.
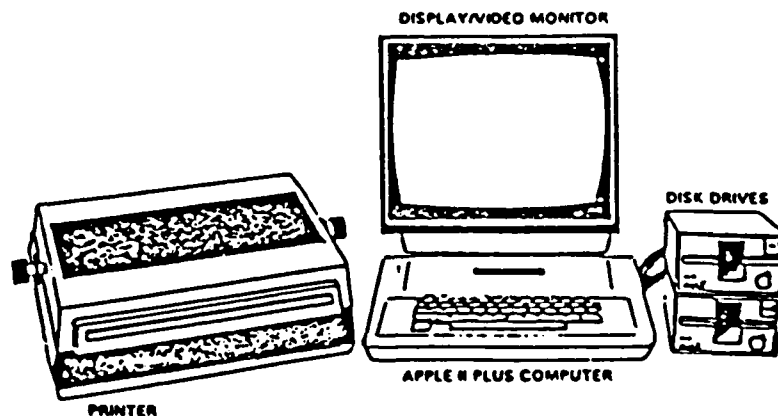
Figure 1. A typical Apple II Plus computer.

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Internal Layout and Memory

The Apple computer must be outfitted with 48K bytes of random access memory (RAM). The memory resides on two printed circuit boards (PCBs) inside the Apple. The internal layout of the Apple is shown in Figure 2. The amount of memory can be verified by removing the Apple's cover, counting the number of RAM integrated circuits (ICs) on the large PCB in the bottom of the case, and assuring that an Apple Language Card (or equivalent) occupies slot 0 (leftmost peripheral connector) on the PCB.

Figure 3 shows the slot layout and numbering convention that we will use throughout the remainder of this section. Note that there are eight slots (connectors) numbered from 0 to 7.
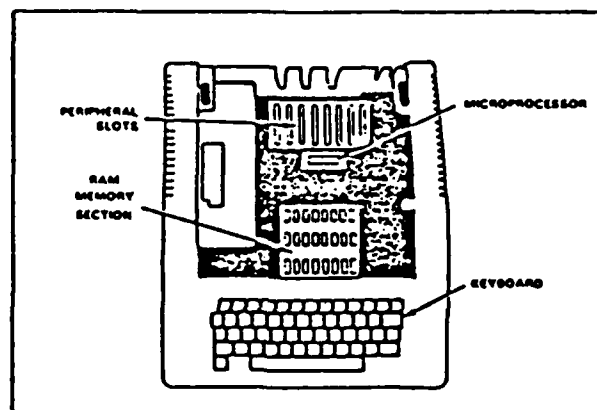
Figure 2. Inside the Apple II computer.
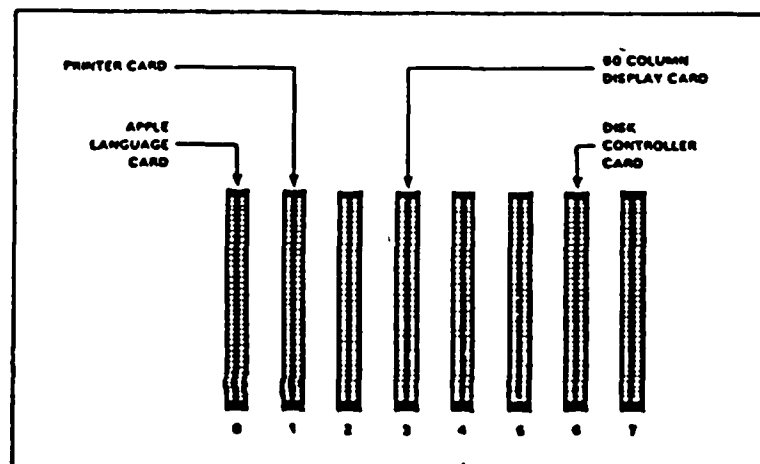
Figure 3. Peripheral slot assignments.

The area in which the RAM ICs are located on the large PCB is designated, by a 4-by-4-inch square outlined in white and marked RAM. Twenty-four sockets populate this area of the board; 23 should contain ICs. The 24th socket (left-most, rear) should be occupied by a plug connected to the Apple language card (occupying slot 0) via a ribbon cable.

80-Column Card

The Apple normally displays uppercase text in a 40 x 23 format, that is, 23 lines of 40 characters per line. The 80-column card converts computer-generated characters to upper and lower case and displays them in an 80 x 23 format.

The Videoterm 80-column card manufactured by VIDEX is a popular card for this purpose, although other manufacturers offer suitable substitutes. This card should be located in peripheral slot 3 (that's the fourth slot from the left; remember, start counting with zero). A cable runs from the top, front corner (edge nearest keyboard) of the card through the rear of the Apple case. The end of the cable that exits the case is fitted with an RCA-type connector which the display/monitor plugs into for its video signal.

Display/Video Monitor

The display/video monitor, a cathode ray tube (CRT), is the computer's primary means of communicating with you. The monitor looks like a television without the channel selector. Its primary controls consist of an on/off switch and a brightness/contrast adjustment. Many brands of monitors can be used with an 80-column card as long as they have a bandwidth of 12 MHz or greater. Monitors built by Leedex and Sanyo have been found to work well with the Videoterm 80-column card.

The monitor can display 23 lines of text with up to 80 characters per line (see 80-Column Card above). The position at which a typed character will appear on the CRT is marked by a rectangular figure called a cursor. At each keystroke, the cursor advances one position to the right. When you type beyond the 80-character width of the display, the cursor automatically returns to the left margin and drops down a line to begin a new line.

Disk Drive

The disk drive is used for storing and retrieving programs and data that the computer needs to satisfy your processing requirements. The programs and data are actually stored on a flexible diskette (also called a floppy disk) that can be inserted into and removed from the disk drive. The disk drive writes and reads data to and from the diskette as required.

The disk drive is housed in a metal box 4 inches high by 6 inches wide by 9 inches long. It connects to the Apple by a ribbon connector to a disk controller card (PCB) located in slot 6 of the Apple (see Figure 3). Your system has two disk drives. Both of them connect to the same PCB in slot 6. One of the drives is designated as 1 and the other as 2. The front of the disk drive has a slot and a small door or latch. It is through this slot that you insert the diskette you wish to use.

The diskette (Figure 4) measures about 5-1/4 inches along each side. Handle it carefully. Avoid bending it or touching the surfaces exposed by the oval cutouts on each side of the protective plastic jacket. Do not force the diskette into the disk drive, or you may permanently damage it.

To insert a diskette into a drive, open the latch on the front of the drive by pulling outward on its lower edge. There is only one correct way to insert a diskette into the drive: The label must face upward and the oval hole in the plastic jacket must enter the drive first. Any other orientation of the diskette is incorrect. An easy way to assure the proper orientation is to hold the diskette with your thumb over the label as you insert it into the drive (see Figure 5). Once the diskette is fully seated, close the drive latch by pushing down on it until it snaps into the closed position.
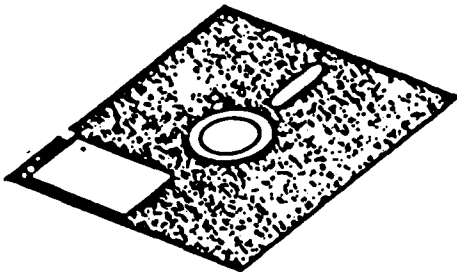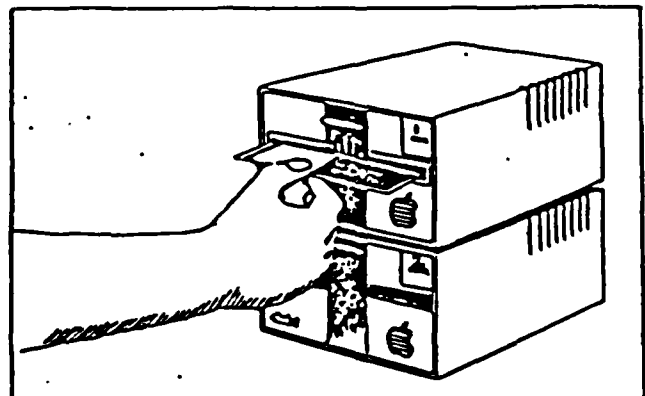
Figure 4. Diskette.

Figure 5. Inserting a diskette into an Apple II disk drive.

Keyboard

The keyboard is used to communicate with the computer. Through the keyboard, you can give instructions, answer queries, make selections, or input required data. As characters are typed, they appear on the display at the location indicated by the cursor.

While it is similar in layout to a standard typewriter keyboard, the Apple keyboard has some special keys you should know about. Figure 6 shows the keyboard arrangement.

ESC (row 2, position 1)--the ESC (escape) key is a nonprinting character key. That is, although the computer recognizes that the key has been pressed and may even perform some programmed function, it does not display anything on the monitor; in fact, the cursor does not advance either. You will probably not need to use this key. If you press it inadvertently, it can be cancelled by pressing the back arrow key.

CTRL (row 3, position 1)--The CTRL (control) key does nothing by itself. For CTRL to have an effect, it must be held down while another key is pressed. Control characters do not appear on the screen. Certain control characters may move the cursor about, interrupt program execution, or produce other unexpected results.

SHIFT (row 3, position 1 and last)--The SHIFT key permits some of the keys on the keyboard to have two functions. Those keys with dual functions are marked with two different characters on the same keycap. Pressing SHIFT and simultaneously pressing a dual function key produces the upper character shown on the keycap. The exception to this is "G," with which SHIFT has no effect.

RESET (row 1, last position)--The RESET key aborts whatever process is going on and restarts the system. On some Apples, RESET must be pressed simultaneously with CTRL.

REPT (row 2, next to last position)--The REPT (repeat) key pressed simultaneously with another key causes the other character to be repeatedly transmitted to the computer and repeatedly displayed on the CRT.

RETURN (row 2, last position)--The RETURN key is similar to the carriage return key found on most electric typewriters. Pressing RETURN moves the cursor down one line to the left edge of the CRT. RETURN is normally used after typing an instruction, query, or piece of data on the keyboard to signal the computer to accept the input. Each response you make through the keyboard must be terminated by a RETURN before the computer will act upon it.

<--- (row 3, next to last position)--The left arrow moves the cursor left one position each time it is pressed. Its primary purpose is to allow you to make corrections to the line of text or data you are currently typing. To make the correction, press the left arrow until the cursor overlays the character you wish to correct. Pressing the correct character key at this point will replace the previous character. The remainder of the line must be retyped either by repeatedly striking the right arrow key to the end of the data or text line or by rekeying each character. (End the line with RETURN.)

The left arrow moves the cursor left until it reaches the left edge of the CRT. An additional press of the key moves the cursor up one line and to the right edge of the CRT. Note that using the left arrow and subsequently replacing characters on the CRT that have earlier been terminated by a RETURN will not alter that line. Once RETURN has been pressed, the computer acts upon the text/data preceding RETURN.

---> (row 3, last position)--The right arrow moves the cursor one position to the right each time it is pressed. It is normally used in conjunction with the left arrow key to make corrections to the last line displayed on the CRT. When the cursor occupies the same position as a character, pressing the right arrow has the effect of retyping or confirming that character and moving the cursor one position to the right.
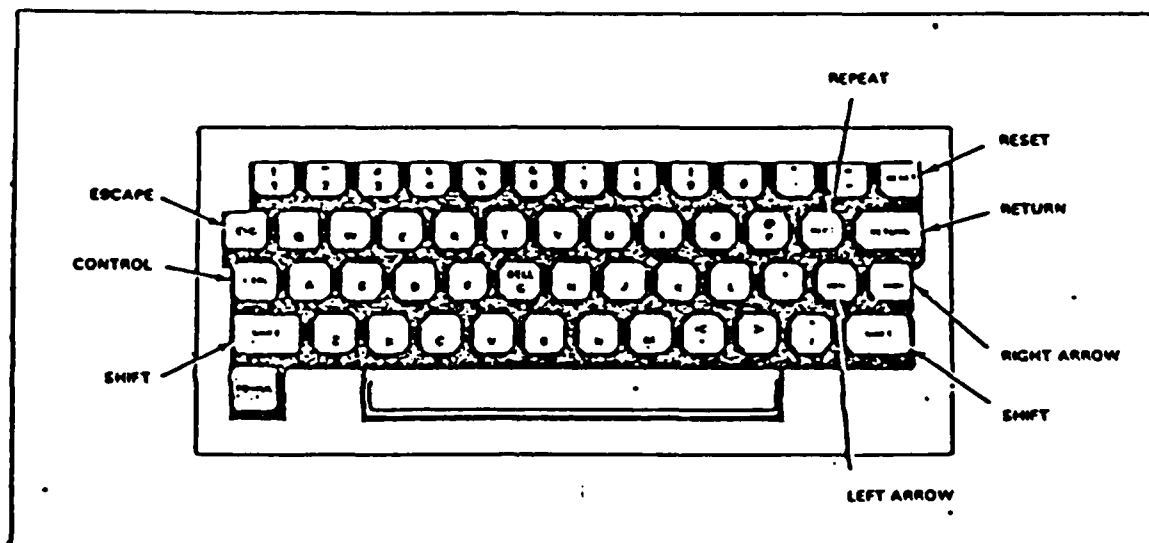
Figure 6. Apple II keyboard.

Printer

The printer is the computer's secondary means of communicating with you. Generally, results that are lengthy, that you may want to keep permanently, or that you want to analyze in detail are the kinds of data that will be directed to the printer. If output is directed to the printer, it will not also appear on the display.

A typical printer is shown in Figure 7. Many brands and models are compatible with the Apple. All will likely have at least the features discussed below, although different manufacturers may use different names for the same feature or capability.

The printer connects to the Apple through a ribbon cable that attaches to a printer interface card (PCB) that occupies slot 1 in the Apple. The printer's own power cord must be plugged into a 110-volt, 60-cycle wall outlet.

Paper for the typical printer comes in pages that are 11 inches long. Each page is joined along an easy-tear perforation in an alternating pattern so that it stacks compactly and feeds freely. The outer edge of the paper has uniformly spaced holes that match up with the sprockets found on the roller of the printer. This arrangement maintains accurate alignment and positive feed of the paper. Some printers do not use sprocket feed but rely on a friction feed mechanism similar to that used in an office typewriter. If paper is not already in the printer, consult the printer's user's manual for its proper installation.

On/Off Switch. The printer has its own ON/OFF switch, usually easily accessible on the front or right side (as you stand in front) of the printer. When the printer is on, an indicator light should also be lit.

Figure 7. Printer.

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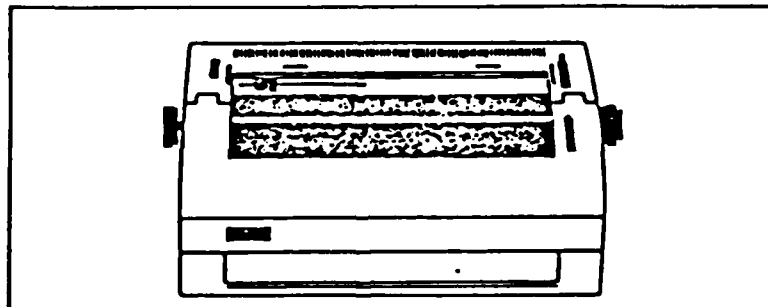
On Line/Off Line Button. When ON LINE is selected, the printer is ready to accept output from the computer. In the OFF LINE mode, the printer notifies the computer not to send any data to it. The printer must be in the OFF LINE mode when doing either a FORM FEED or LINE FEED operation.

Form Feed Button. This may also be referred to as the TOF (top of form) button. Pressing this button advances the paper in the printer to the top of the next page. This feature needs to be calibrated each time the printer is turned on; details are covered in the user's manual of the printer.

Once the paper is positioned so that the perforation is just above the print head and the printer is initialized according to the manufacturer's instructions, FORM feed will forward the paper so that the next perforation line moves to the same position above the print head as it did at initialization.

Line Feed Button. This button advances the paper a single line space each time it is pressed.

Starting Up the Apple System

Three of the components of the system require standard 110-volt, 60-cycle power: The Apple, the video monitor, and the printer. Make sure that each is plugged into a proper receptable. Turn on the monitor and the printer. Next, insert the diskette labeled CAPS 1 into disk drive 1, and the diskette labeled CAPS 2 into disk drive 2. Now turn on the Apple. The program will then begin running.

Turning Off the Apple System

When you are ready to turn off the system, remove the diskettes from the disk drives. If you have printed output still in the printer, advance with the FORM FEED or LINE FEED button until the printed portion exits the printer. Tear off the paper containing your output.

You may turn off the system by setting the power switch on each of the three components (Apple, video monitor, printer) to the OFF position. You may turn off these components in any order you wish.

ORGANIZATION OF OPTIONS IN CAPS

The Collection and Allocation Planning System (CAPS) is designed to provide you with a variety of options for developing collection plans and allocating collection resources. CAPS is organized into three primary menus: the MAIN MENU, the PLAN MENU, and the ALLOCATION MENU (see Figure 8).

The MAIN MENU is the umbrella under which the other two menus reside. It provides general options such as those for saving and deleting plans and for indicating your overall intention (i.e., load an existing plan, begin a new plan, or terminate the session).

The PLAN MENU and the ALLOCATION MENU focus on the details of plan development. The PLAN MENU is normally used first, then the ALLOCATION MENU.

The PLAN MENU provides options for the first phase of plan development. In this phase:

1. The analyst formulates the essential element of information (EEI), relevant friendly responses, and specific information requirements (SIRs).

2. The analyst examines and quantifies relationships between these items.

3. Based on input in step 2, the computer assigns a priority value to each specific information requirement (SIR) according to its importance in answering the essential element of information (EEI).

The ALLOCATION MENU provides options for the second phase of development which is entered once SIR priority has been established. In this phase:

4. The analyst evaluates collection resources in terms of their ability to collect information that will answer the specific information requirements.

5. The computer displays a list of collection resources assigned to each specific information requirement with feedback regarding the usefulness of the resource allocations.

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MAIN MENU .

1) CREATE NEW PLAN
2) LOAD OLD PLAN
3) SAVE PLAN
4) DELETE PLAN
5) GO TO PLAN MENU
6) REVIEW INTRODUCTION
7) TERMINATE THIS SESSION

PLAN MENU

1) RESUME ENTERING EEI, CA, SIRS
   2) EDIT EEI, CA, SIRS
3) ENTER PLAN VALUES
   4) EDIT PLAN VALUES
5) SOLVE THE PLAN
6) USE THE DIAGNOSTIC PACKAGE
7) RETURN TO THE MAIN MENU

ALLOCATION MENU

1) ASSESS COLLECTION RESOURCE CAPABILITIES
   2) EDIT COLLECTION RESOURCE CAPABILITIES
   3) REVIEW ASSIGNMENT OF SIRS TO COLLECTION
      RESOURCES
4) SOLVE FOR ALLOCATION LIST
   5) REVIEW ALLOCATION LIST
6) CR LIST MENU
7) RETURN TO PLAN MENU

Figure 8. The three primary menus in the Collection and Allocation Planning
System.

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before proceeding, note the following conventions:

1. After entering a value, always press the RETURN key to initiate processing of the data. Ordinarily, RETURN should be pressed after entry of a single value. In some cases, however, up to six values should be entered before pressing RETURN. These exceptions are noted where applicable.

2. To exit a particular routine, you simply press RETURN when CAPS displays the prompt "PRESS RETURN WHEN DONE." To move from one menu to another you must choose the appropriate option in the menu (usually the last one).

3. Options in each menu are ordered according to typical usage. For example, you would normally choose and work through option 1 before proceeding to option 2. Subcategories, such as edit options, are presented in an indented format.

WORKING THROUGH A COLLECTION PLAN

The purpose of this section is to walk through the development of a collection plan. The emphasis here is on the sequence of events in a typical plan development. The sequence is illustrated by examples of displays you can expect to see and typical input you might provide. Each CAPS option is described in greater detail in the last section.

In this guide, user input is indicated by a box. Note that you should enter all of the values shown in the box before pressing RETURN.

In general, there are two approaches that you can take in developing a collection plan. If you are beginning a new collection plan, you must formulate and enter specific friendly actions, enemy actions, and information requirements, as well as attach numerical estimates to the various actions. On the other hand, if you have previously developed a plan, stored it on the disk, and now want to evaluate it with a new set of collection resources, you may simply load the model stored on disk and skip entering textual and numerical information.

Creating a New Plan

First, you must start up the system. Insert the CAPS 1 diskette in disk drive 1 and the CAPS 2 diskette in disk drive 2 and turn on the computer.

CAPS presents a brief introduction to and overview of the aid and then displays the MAIN MENU:

```
        MAIN MENU
   1) CREATE NEW PLAN
   2) LOAD OLD PLAN
   3) SAVE PLAN
   4) DELETE PLAN
   5) GO TO PLAN MENU
   6) REVIEW INTRODUCTION
   7) TERMINATE THIS SESSION

   ENTER OPTION (1-7):  1
```

In this case, you would enter option 1.

When you begin developing a new plan, you write over the old plan information you have entered but not stored. Therefore, CAPS gives you the opportunity to save an old plan in the computer's memory on a diskette by displaying the following:

```
   TO BEGIN PHASE I (DEVELOPING A NEW COLLECTION PLAN),
   ALL PREVIOUS ENTRIES WILL BE ERASED.  IF YOU CURRENTLY
   HAVE A PLAN IN MEMORY THAT YOU WANT TO KEEP, YOU
   MUST SAVE IT BEFORE CONTINUING.

   SELECT ONE OF THE FOLLOWING:

   1) BEGIN NEW PLAN
   2) SAVE OLD PLAN
   3) RETURN TO MAIN MENU

   ENTER OPTION (1-3):  1
```

In this example, select option 1 (BEGIN NEW PLAN) since you are beginning a new session and there is no plan in memory to save.

Enemy Activities

CAPS prompts you to identify enemy activities by displaying:

ENTER AN ESSENTIAL ELEMENT OF INFORMATION (EEI):

In response to this prompt, you might enter the following:

| WHERE WILL THE ENEMY ATTACK? |

Next, CAPS requests likely EEI alternatives. Assume that "attack north sector" and "attack east sector" are reasonable alternatives. Type each alternative, followed by a RETURN.

ENTER LIKELY EEI OPTIONS THAT THE
ENEMY MIGHT EXERCISE. (ABBREVIATE
EACH OPTION TO A MAXIMUM OF FIVE
LETTERS.)

PRESS <RETURN> WHEN DONE

1) | AK N |
2) | AK E |
3) | <RETURN> |

CAPS now gives you the opportunity to edit the entries you have just made. Suppose that you want to add a third EEI option, attack south sector. The procedure is depicted below:

EEI:
0) WHERE WILL THE ENEMY ATTACK?
   1) AK N
   2) AK E

PRESS "C" TO CHANGE A LINE
PRESS "A" TO ADD
PRESS "D" TO DELETE
PRESS <RETURN> WHEN DONE

| A |

ENTER ANOTHER LIKELY EEI OPTION.
(PRESS <RETURN> FOR NO ENTRY)
| AK S |

CAPS redisplays the EEI, EEI options, and edit options. Press RETURN if there are no other changes that you want to make.

CAPS asks if you wish to continue developing the plan. Enter "Y" for yes.

Friendly Activities

Next, CAPS prompts you for friendly activities by displaying:

ENTER A FRIENDLY COURSE OF ACTION (CA)
TAKEN IN RESPONSE TO ANTICIPATED ENEMY ACTION

DEFEND AGAINST ENEMY ATTACK

ENTER LIKELY CA OPTIONS THAT THE FRIENDLY
COMMANDER MIGHT EXERCISE. (ABBREVIATE EACH
OPTION TO A MAXIMUM OF FIVE LETTERS)

PRESS <RETURN> WHEN DONE

1) DF N
2) DF E
3) DF S
4) DF ALL
5) <RETURN>

CAPS now allows you to edit your new entries. Suppose that you want to delete the fourth option. CAPS displays:

CA
0) DEFEND AGAINST ENEMY ATTACK
   1) DF N
   2) DF E
   3) DF S
   4) DF ALL

PRESS "C" TO CHANGE A LINE
PRESS "A" TO ADD
PRESS "D" TO DELETE
PRESS <RETURN> WHEN DONE

D
ENTER NUMBER OF LINE FOR DELETION: 4

CAPS requests confirmation before deleting the line.

ARE YOU SURE THAT YOU WANT LINE 4 DELETED?(Y/N) Y

CAPS redisplays the course of action (CA), three CA options (minus option 4, which you just deleted), and the edit options. Press RETURN if you require no further changes.

Again, CAPS asks if you wish to continue developing the plan. Enter a "Y" for yes.

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Specific Information Requirements

Finally, enter specific information requirements (SIRs). CAPS displays:

ENTER A SPECIFIC INFORMATION REQUIREMENT (SIR)
THAT WILL HELP TO CONFIRM OR DENY AT LEAST ONE
EEI OPTION:

> ARE TROOPS IN VICINITY SCHWEINFURT,
> NA 885443?

ENTER POSSIBLE ANSWER TO THIS SIR.
(PRESS <H> FOR HELP)
(ABBREVIATE EACH OPTION TO A MAXIMUM
OF FIVE LETTERS.)

1) YES
2) NO
3) <RETURN>

CAPS then gives you the opportunity to edit the SIR and SIR options. If no editing is required, press RETURN.

You should enter at least one more SIR so type "Y" in response to the question "DO YOU WISH TO CONTINUE ENTERING SIRS?" To enter another SIR, follow the procedure outlined above. Enter this SIR:

> IS THERE AN AMMUNITION RESUPPLY POINT AT
> SCHWEINFURT, NA 885042?

and these SIR options:

1) YES
2) NO
3) <RETURN>

Again, CAPS gives you the opportunity to edit the entries. If no changes are required, press RETURN.

When you have completed entry of the SIRs, enter "N" in response to the question "DO YOU WISH TO CONTINUE ENTERING SIRS?" CAPS then displays the PLAN MENU:

1) RESUME ENTERING EEI, CA, SIRS
   2) EDIT EEI, CA, SIRS
3) ENTER PLAN VALUES
   4) EDIT PLAN VALUES
5) SOLVE THE PLAN
6) USE THE DIAGNOSTIC PACKAGE
7) RETURN TO THE MAIN MENU

ENTER OPTION (1-7): 3

Plan Values

Selecting option 3 permits you to enter the plan values--numerical esti-
mates of the probability of occurrence and utility of the data you have just
entered.

<u>Prior probability of EEI options</u>. The first estimates that you enter
concern the prior probability of the EEI options. CAPS displays the following:

> PRIOR TO RECEIVING ANY NEW INTELLIGENCE OR OTHER
> INFORMATION, ENTER YOUR CURRENT ESTIMATE OF THE
> PROBABILITY (0-100) THAT EACH OF THESE EEI OPTIONS
> WILL OCCUR. (ENTRIES MUST TOTAL 100)
>
> PRESS <RETURN> WHEN DONE, <H> FOR HELP

	AK N	AK E	AK S
ENTER VALUES HERE:	30	40	30

Note that you enter several values before hitting RETURN. Immediately
after entering these values CAPS allows you to edit them. If they are satis-
factory, press RETURN in response to the prompt "ENTER REVISED VALUES HERE."
Otherwise, reenter all the values, making changes where needed.

Relative worth of friendly to enemy actions. The next estimates that you enter concern the relative worth of friendly to enemy actions. CAPS displays:

GIVEN THE FOLLOWING ENEMY EEI OPTIONS, ENTER A
VALUE (0-100) THAT REPRESENTS THE RELATIVE WORTH
OR MERIT OF THESE POSSIBLE FRIENDLY OPTIONS.

PRESS <RETURN> WHEN DONE, <H> FOR HELP

	FRIENDLY CA OPTIONS		
	DF N	DF E	DF S
EEI OPTIONS			
1) AK N	0	0	0
2) AK E	0	0	0
3) AK S	0	0	0

ENTER VALUES FOR LINE 1 HERE: ┌─────────┐ 80 10 20 └─────────┘

CAPS fills in the matrix with the values for line 1 and requests values for line 2.

ENTER VALUES FOR LINE 2 HERE: ┌─────────┐ 10 70 30 └─────────┘

CAPS places these values in the matrix and requests values for line 3.

ENTER VALUES FOR LINE 3 HERE: ┌─────────┐ 30 40 90 └─────────┘

Next, you can edit the estimates just entered. Suppose that you want to change the values for line 1. The procedure is depicted below.

GIVEN THE FOLLOWING ENEMY EEI OPTIONS, ENTER A
VALUE (0-100) THAT REPRESENTS THE RELATIVE WORTH
OR MERIT OF THESE POSSIBLE FRIENDLY OPTIONS.

PRESS <RETURN> WHEN DONE, <H> FOR HELP

	FRIENDLY CA OPTIONS		
	DF N	DF E	DF S
EEI OPTIONS			
1) AK N	80	10	20
2) AK E	10	70	30
3) AK S	30	40	90

TO CHANGE A VALUE, ENTER THE ROW NO (1-3): ┌─┐ 1 └─┘
THE CURRENT VALUES ARE: 80 10 20
ENTER REVISED VALUES HERE: ┌──────────┐ 65 10 25 └──────────┘

When you press return, CAPS redisplays the matrix with the new values for line 1. If you are satisfied with these estimates, press RETURN when CAPS prompts "TO CHANGE A VALUE, ENTER THE ROW NO."

Conditional probability of SIR options. The final estimates that you en-
ter are the conditional probabilities of SIR options. CAPS requests entries
for the first SIR.

      FOR SIR (1):   ARE TROOPS IN VICINITY SCHWEINFURT,
                    NA 885443?

      GIVEN THE FOLLOWING ENEMY EEI OPTIONS, WHAT IS
      THE PROBABILITY THAT EACH OF THE SIR OPTIONS
      LISTED BELOW WOULD BE OBSERVABLE?

      PRESS <RETURN> WHEN DONE, <H> FOR HELP

	SIR OPTIONS	
	YES	NO
EEI OPTIONS		
1) AK N	0	0
2) AK E	0	0
3) AK S	0	0

      ENTER VALUES FOR LINE 1 HERE: | 70 30 |

CAPS fills in the matrix with the values for line 1 and requests the val-
ues for line 2.

      ENTER VALUES FOR LINE 2 HERE: | 60 40 |

CAPS places these values in the matrix and requests values for line 3.

      ENTER VALUES FOR LINE 3 HERE: | 35 65 |

CAPS redisplays the matrix and allows you to edit these new estimates.

      FOR SIR (1):   ARE TROOPS IN VICINITY SCHWEINFURT,
                    NA, 885443?

      GIVEN THE FOLLOWING ENEMY EEI OPTIONS, WHAT IS THE
      PROBABILITY THAT EACH OF THE SIR OPTIONS LISTED BELOW
      WOULD BE OBSERVABLE?

      PRESS <RETURN> WHEN DONE, <H> FOR HELP

	SIR OPTIONS	
	YES	NO
EEI OPTIONS		
1) AK N	70	30
2) AK E	60	40
3) AK S	35	65

      TO CHANGE A VALUE, ENTER THE ROW NO (1-3):

If you are satisfied with these estimates, press RETURN.

Next, CAPS requests entries for the second SIR.

FOR SIR(2):   IS THERE AN AMMUNITION RESUPPLY
              POINT AT SCHWEINFURT, NA 885042?

GIVEN THE FOLLOWING ENEMY EEI OPTIONS, WHAT IS
THE PROBABILITY THAT EACH OF THE SIR OPTIONS
LISTED BELOW WOULD BE OBSERVABLE?

PRESS <RETURN> WHEN DONE, <H> FOR HELP

| | SIR OPTIONS | |
	YES	NO
EEI OPTIONS		
1) AK N	0	0
2) AK E	0	0
3) AK S	0	0

ENTER VALUES FOR LINE 1:   50 50

ENTER VALUES FOR LINE 2:   60 40

ENTER VALUES FOR LINE 3:   30 70

After you have filled in the matrix, CAPS gives you the opportunity to
edit the entries. If they are satisfactory, press RETURN while CAPS is wait-
ing for a response to the prompt "TO CHANGE A VALUE, ENTER ROW NO. (1-3)."

Solving the Plan

After completing entry of probability estimates for the SIR option, CAPS displays the PLAN MENU.

1) RESUME ENTERING EEI, CA, SIRS
   2) EDIT EEI, CA, SIRS
3) ENTER PLAN VALUES
   4) EDIT PLAN VALUES
5) SOLVE THE PLAN
6) USE THE DIAGNOSTIC PACKAGE
7) RETURN TO THE MAIN MENU

ENTER OPTION (1-7): $\boxed{5}$

Entering option 5 permits you to complete the plan by determining optimal resource allocation. There are two steps in this phase. First, you will assess the priority of each specific information requirement (SIR). Then you will assess the capability of the collection resources to collect information to answer each SIR.

Specific Information Requirement (SIR) Priority

CAPS presents an explanation of SIR priority and asks whether a printout of the SIR priority values (presented in the next display) should be made. Enter "Y" if you want a printout or "N" if you do not.

The CAPS display of priority values should be similar to the following:

SIR PRIORITY VALUES

1) SIR NO. 1   PRIORITY: 0.42105
    SIR1: ARE TROOPS IN VICINITY SCHWEINFURT, NA 885433?

2) SIR NO. 2   PRIORITY: 1.00000
    SIR2: IS THERE AN AMMUNITION RESUPPLY POINT AT
          SCHWEINFURT, NA 885042?

If these values appear consistent with your intuitive assessment of SIR importance, proceed to the final step: assessing collection resource capabilities. Choose option 1 from the following menu.

If these values are not satisfactory, choose option 2 for help or option 3 to return to the PLAN MENU for the edit option.

1) PROCEED TO ASSESS COLLECTION RESOURCE CAPABILITIES
2) HELP
3) RETURN TO PLAN MENU

ENTER OPTION (1-3): $\boxed{1}$

Assess Collection Resource (CR) Capabilities

If you choose option 1, CAPS informs you that you must specify a list of collection resources (CRs) and displays the CR LIST MENU. In this example, load an existing list named "MYLIST" as follows:

```
SELECT ONE OF THE FOLLOWING:
1) CREATE NEW CR LIST
2) LOAD CR LIST
3) DELETE CR LIST
4) SAVE CR LIST
5) PRINT CURRENT LIST
6) EXIT

ENTER OPTION (1-6):  2
```

CAPS displays the names of available CR lists, as in this sample:

```
THE FOLLOWING MODELS ARE ON THIS DISK:
1) EXAMPLE1
2) EXAMPLE2
3) MYLIST
4) *VACANT

PICK ONE:  3
```

CAPS asks for confirmation that you wish to load list 3, then returns to the CR LIST MENU. Choose option 6 to exit.

CAPS asks if you want a printout of the CR list that you just loaded. Since it is very important to have a printed list to refer to when assessing collection resource capabilities, enter "Y" for yes. MYLIST looks like this:

```
COLLECTION RESOURCE LIST:  MYLIST
 1) CI     COUNTER INTELLIGENC    20TH MI CO
 2) IPW    INTERROGATION SECT     20TH MI CO
 3) COLL   COLLECTION TEAM        21ST MI CO
 4) LRRP   AIRBORNE INF RANG      20TH INF
 5) UGS    UNATTENDED GRND SEN    20TH INF
 6) IR     INFARED MOHAWK         20TH AER
 7) SLAR   SIDE LOOKING RADAR     20TH AER
 8) FOTO   PHOTO-MOHAWK           20TH AER
 9) VR     VISUAL RECONN          20TH AER
10) SLAR   SIDE LKNG RDR-AF       20TH MI BTN
11) FOTO   PHOTO-AF JET           20TH MI BTN
12) AO     AVIATION SECTION       HC-1ST BRIG
13) AO     AVIATION SECTION       HC-2ND BRIG
14) LIA    DIVISION LIAISON       56 INF DIV
15) LIA    DIVISION LIAISON       57 INF DIV
16) LIA    CORPS LIAISON          3RD CRP
17) GR     GRND SURVEILLANCE      71ST INF
18) GR     GRND SURVEILLANCE      68TH INF
19) FO     SCOUT SECTION          71ST INF
20) FO     SCOUT SECTION          68TH INF
```

Next, you must choose a specific information requirement to begin working with. CAPS displays a list of SIRs and requests that you choose one. Enter the number of the first SIR.

SIRS

1) ARE TROOPS IN VICINITY SCHWEINFURT,
   NA 885443?

2) IS THERE AN AMMUNITION RESUPPLY POINT AT
   SCHWEINFURT, NA 885042?

ENTER THE NUMBER OF THE DESIRED SIR (1-2):   1

Once you have obtained a printout and chosen an SIR, you are ready to begin assessing collection resource capabilities. CAPS displays the SIR and requests that you identify the collection resources most capable of collecting information to answer this SIR in this scenario.

SIR(1):   ARE TROOPS IN VICINITY SCHWEINFURT,
          NA 885443?

ENTER THE NUMBER OF THE COLLECTION RESOURCE (1-20)
AND A VALUE (0-100) REPRESENTING ITS ABILITY TO
COLLECT THE INFORMATION TO ANSWER THIS SIR.

PRESS <RETURN> WHEN DONE, <H> FOR HELP

CR   CAPABILITY
| 1   37 |

Also, enter the following CR numbers and capabilities.

| 3   28 |

| 4   57 |

| 7   34 |

Once these are entered, exit by pressing RETURN while CAPS is waiting for entry of another CR number and capability estimate.

CAPS then returns to the list of SIRs so that you can choose another one. Enter the number of the second SIR. CAPS then displays the second SIR and requests you to identify the collection resources most capable of collecting information in this scenario.

SIR(2): IS THERE AN AMMUNITION RESUPPLY POINT AT
SCHWEINFURT, NA 885042?

ENTER THE NUMBER OF THE COLLECTION RESOURCE (1-20)
AND A VALUE (0-100) REPRESENTING ITS ABILITY TO
COLLECT THE INFORMATION TO ANSWER THIS SIR.

PRESS <RETURN> WHEN DONE, <H> FOR HELP

```
CR              CAPABILITY
1                   23
```

Also, enter the following CR numbers and capabilities.

```
10                  56
```

```
12                  13
```

```
17                  48
```

Exit by pressing RETURN while CAPS is waiting for entry of another CR number and capability. CAPS then returns to the list of SIRs. Exit again by pressing RETURN. This should bring you to the ALLOCATION MENU.

1) ASSESS COLLECTION RESOURCE CAPABILITIES
  2) EDIT COLLECTION RESOURCE CAPABILITIES
  3) REVIEW ASSIGNMENT OF SIRS TO COLLECTION
    RESOURCES
4) SOLVE FOR ALLOCATION LIST
  5) REVIEW ALLOCATION LIST
6) CR LIST MENU
7) RETURN TO PLAN MENU

ENTER OPTION (1-7):   4

Now all of the information necessary to solve the collection plan has been entered. Enter option 4 to solve for a list of collection resource allocations.

CAPS asks whether you want a printout of the allocation list. Enter a "Y" (yes). The allocation list will look like the following:

```
-----------------------------------------------------------------

    SIR(1):   ARE TROOPS IN VICINITY    PRIORITY:  0.421
              SCHWEINFURT, NA 885443?

       CR              CAPABILITY              UTILITY
    1)CI               37                      15
    3)COLL             28                      11
    4)LRRP             57                      24
    5)SLAR             34                      14


    THE CUMULATIVE AMOUNT ANSWERED BY THE ABOVE CRS IS 51.5%.


-----------------------------------------------------------------

    SIR(2):   IS THERE AN AMMUNITION   PRIORITY:  1.000
              RESUPPLY POINT AT SCHWEINFURT, NA 885042?

       CR              CAPABILITY              UTILITY
    1)CI               23                      23
    10)SLAR            56                      56
    12)AO              13                      13
    17)GR              48                      48


    THE CUMULATIVE AMOUNT ANSWERED BY THE ABOVE CRS IS 84.7%.


-----------------------------------------------------------------
```

   After examining the allocation list, press RETURN. CAPS suggests the
next step could be to use the diagnostic package for more feedback or update
the plan with new information. In this case, however, we will illustrate how
to return to the MAIN MENU, save the plan for future use, and terminate the
session. The procedure follows:

   1.   Press RETURN to get back to the ALLOCATION MENU.

   2.   Enter option 7 in the ALLOCATION MENU to return to the PLAN MENU.

   3.   Enter option 7 in the PLAN MENU to return to the MAIN MENU.

   4.   Enter option 3 in the MAIN MENU to SAVE THE PLAN.

   5.   Enter the name of the collection plan to save.

   6.   Enter option 7 in the MAIN MENU to terminate the session.

   When saving a plan, only the entries made in the first phase (EEI, CA,
SIRs, and plan values) will be stored on the disk. The allocation of collec-
tion resources will not be saved due to limitations of the computer system.
Therefore, when you load the plan in a future session, if no updating of the
plan values is required, you can proceed immediately to SOLVE THE PLAN, op-
tion 5 in the PLAN MENU, and begin assessing collection resource capabilities.

DETAILED DESCRIPTION OF MENU OPTIONS

This section describes in detail the various options residing in each of CAPS' three primary menus (refer to Figure 8). The section is not intended for general reading but rather as a reference to help you locate the source of problems or to answer specific questions.

Main Menu

The first menu that you encounter is the following:

```
             MAIN MENU

        1) CREATE NEW PLAN
        2) LOAD OLD PLAN
        3) SAVE PLAN
        4) DELETE PLAN
        5) GO TO PLAN MENU
        6) REVIEW INTRODUCTION
        7) TERMINATE THIS SESSION
```

Each MAIN MENU option is described in the following pages.

Main Menu Option 1: Create New Plan

This option provides step-by-step guidance in the development of a completely new plan.

Initially, you are reminded that in creating a new plan, a previous plan in the computer's working memory will be erased. At this point, you may wish to choose option 3 to save the old plan on a disk before proceeding.

To begin developing a new collection plan, you first define and enter:

-an essential element of information (EEI),

-an appropriate friendly course of action (CA), and

-up to twenty specific information requirements (SIRs).

Next you enter plan values. This means estimating the probability of occurrence and relative value of the EEI, CA, and SIR options. The goal of this phase is to rank the specific information requirements in order of their importance.

EEI. The entire collection plan is designed to answer the essential element of information (EEI). The EEI is formulated by the commander and based on mission requirements. While it is possible to have more than one EEI in many situations, this program is limited to one EEI.

CAPS first requests that you enter an essential element of information (EEI). Type in the EEI and press the RETURN key.

Sample EEI:

WHERE WILL THE ENEMY ATTACK?

Next, CAPS prompts you to type in up to six alternative courses of action the enemy might pursue in regard to this EEI. Each option must be abbreviated to five letters. For example, "attack north sector" has been abbreviated "AK N," "attack east sector" has been abbreviated "AK E," "attack south sector" has been abbreviated "AK S." When entry of the options is complete, you can exit by pressing RETURN while CAPS is waiting for entry of another EEI option.

Sample EEI options:

1) AK N
2) AK E
3) AK S

EEI review. After you enter the EEI and EEI options, you may review and
edit them. The display looks like the following:

```
EEI:
0) WHERE WILL THE ENEMY ATTACK?
    1) AK N
    2) AK E
    3) AK S

PRESS "C" TO CHANGE A LINE
PRESS "A" TO ADD
PRESS "D" TO DELETE
PRESS <RETURN> WHEN DONE
```

To change a particular line, press "C." To add new EEI options to exist-
ing ones, press "A." To delete an EEI option, press "D." Deletion of the EEI
itself (line 0) is not permitted, but the EEI can be restated by using the "C"
(change) edit option. For both the "C" (change) and "D" (delete) edit options,
you are prompted to enter the number of the line for editing. This refers to
the number to the left of each entry (i.e., 0 for the EEI and 1-6 for the EEI
options).

Friendly CA. After you enter and review the EEI, CAPS requests that you
enter a friendly course of action (CA) that can be taken in response to the
anticipated enemy action specified in the EEI. While several CAs could be
considered in some situations, this program is limited to one CA.

Sample CA:

DEFEND AGAINST ENEMY ATTACK

Next, CAPs requests that you enter up to six CA options from which the
friendly force commander could choose. Each option must be abbreviated to a
maximum of five letters. For example, "defend north sector," "defend east sec-
tor," and "defend south sector" have been abbreviated as "DF N," "DF E," and
"DF S." You can signal completion of entries by pressing RETURN while CAPS is
waiting for entry of another CA option.

Sample CA options:

    1) DF N
    2) DF E
    3) DF S

Friendly CA review. When you have entered the CA and CA options, CAPS displays and allows you to edit these entries:

```
CA
0) DEFEND AGAINST ENEMY ATTACK
   1) DF N
   2) DF E
   3) DF S

PRESS "C" TO CHANGE A LINE
PRESS "A" TO ADD
PRESS "D" TO DELETE
PRESS <RETURN> WHEN DONE
```

The edit options and procedures here are identical to those in the EEI review. Press "C" to change a specific line, "A" to add a new CA option to the existing ones, or "D" to delete a CA option. Deletion of the CA (line 0) is not allowed, but the CA can be restated using the "C" edit option. When CAPS prompts for the number of the line to be edited, use the number to the left of the entry (i.e., 0 for the CA, 1-6 for the CA options).

SIRs. Formulation of the specific information requirements (SIRs) explicitly depends on the scenario (the tactical situation and the operational environment). The SIRs must be related to the essential element of information (EEI) and compatible with the capabilities of the collection resources.

Following entry of the EEI and CA, CAPS prompts you to enter a specific information requirement (SIR) that will help to confirm or deny at least one EEI option. Each SIR should be phrased explicitly with respect to such factors as location, number, and type.

Sample SIR:

ARE TROOPS IN VICINITY
SCHWEINFURT, NA 885443?

Next, CAPS prompts for entry of up to six SIR options. These options must be plausible answers to the SIR. In addition, they must be exhaustive and mutually exclusive; that is, any possible response to the SIR must fall into one, and only one, category or option.

Sample SIR options:

1) YES
2) NO

SIR review. After you have entered the SIR and SIR options, you can use the following edit options: change a line by pressing "C," add a new SIR option to the existing ones by pressing "A," or delete an SIR option or the entire SIR including its options by pressing "D." Note: To delete the entire SIR, enter "0" for the line number.

The display looks like the following:

SIR #1
0) ARE TROOPS IN VICINITY SCHWEINFURT,
   NA 885443?
   1) YES
   2) NO

PRESS "C" TO CHANGE A LINE
PRESS "A" TO ADD
PRESS "D" TO DELETE
PRESS <RETURN> WHEN DONE

CAPS allows you to enter up to twenty SIRs. To exit the cycle of entry and review, you must respond "N" (no) when asked whether you wish to continue entering SIRs. CAPS will then go to the PLAN MENU where you can choose to resume entering text (EEI, CA, SIRs), edit the existing text, or enter plan values.

Once you have completed entry of the text (EEI, CA, SIRs) or exited the create new plan procedure for any reason, CAPS goes to the PLAN MENU. In the PLAN MENU, you have various options that include resuming text entry where you left off, entering plan values, editing plan values, solving the plan, or using the diagnostic package.

Main Menu Option 2:   Load Old Plan

CAPS first displays the plans that are available on the disk. To load a
plan, you should enter the number of the plan and press RETURN. CAPS asks for
confirmation of the plan name. If it is not correct or you have changed your
mind, enter "N" (no) in response to the query. Otherwise, enter "Y" (yes).

CAPS returns to the MAIN MENU once a plan is loaded. Note that you must
load a plan to exit this routine. After returning to the MAIN MENU, you can
either proceed to the PLAN MENU with the plan you just loaded, delete the plan,
load another plan, or create an entirely new plan.

Main Menu Option 3:   Save Plan

CAPS displays the plans that are available on the disk. A maximum of
four plans can be saved at any one time. If four plans are already on the
disk you must delete one before proceeding.

To save a plan, simply enter its name. CAPS will confirm that it has been
saved and return to the MAIN MENU. If you press RETURN without entering a name,
CAPS saves the model under the name "SYSTEM.MODEL."

Main Menu Option 4:   Delete Plan

CAPS first displays the plans available on the disk and then asks you to
enter the name of the plan to be erased. CAPS then deletes the plan and re-
turns to the MAIN MENU.

If you decide you do not want to delete the plan, press RETURN rather than
entering the name.

Plan Menu

You can gain access to the PLAN MENU either by choosing MAIN MENU option 5 (go to plan menu) or by exiting MAIN MENU option 1 (create new plan).

The PLAN MENU provides the following options:

    1) RESUME ENTERING EEI, CA, SIRS
        2) EDIT EEI, CA, SIRS
    3) ENTER PLAN VALUES
        4) EDIT PLAN VALUES
    5) SOLVE THE PLAN
    6) USE THE DIAGNOSTIC PACKAGE
    7) RETURN TO THE MAIN MENU

These options are described in the following sections.

Plan Menu Option 1: Resume Entering EEI, CA, SIRs

This option allows you to resume entering text (EEI, CA, or SIRs) where you left off in the create new plan option. For example, if you had previously entered the EEI, CA, and three SIRs, CAPS would begin prompting with the fourth SIR. Prompting continues through twenty SIRs or until you respond "N" (no) to the query "DO YOU WANT TO CONTINUE ENTERING SIRS?" CAPS then returns to the PLAN MENU.

Plan Menu Option 2: Edit EEI, CA, SIRs

First you must choose from a menu the text that you want to edit: EEI, CA, or one of the SIRs. CAPS displays the text that you choose and provides three edit options identical to those discussed in previous sections.

To change or reword a line of text, press "C." To add a new option, press "A." To delete a line, press "D." An entire SIR along with its options can be erased by entering "0" as the line for deletion. EEIs and CAs cannot be deleted, only reworded.

To return to the previous menu of text options, press RETURN without first entering a character. To return to the PLAN MENU, choose the last option in the text menu.

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Plan Menu Option 3:   Enter Plan Values

When the EEI, CA, and SIRs have been entered and are judged satisfactory, the next step is to express numerically the probability of occurrence and relative usefulness of the EEI, CA, and SIR options. You will enter three types of numerical estimates. They are: (1) the prior probability of the EEI options, (2) the relative worth of friendly to enemy actions, and (3) the conditional probability of the SIR options. Each is discussed below.

Prior probability of EEI options. The collection plan is not prepared in total ignorance of enemy intentions and capabilities. The enemy's doctrine on tactics is known to some extent and an estimate of the enemy's strength is available. This, together with information on factors such as weather and terrain, should make preliminary estimates of likely enemy actions better than just guesses. CAPS prompts for these estimates as follows:

PRIOR TO RECEIVING ANY NEW INTELLIGENCE OR OTHER
INFORMATION, ENTER YOUR CURRENT ESTIMATE OF THE
PROBABILITY (0-100) THAT EACH OF THESE EEI OPTIONS
WILL OCCUR.   (ENTRIES MUST TOTAL 100.)

(PRESS <RETURN> WHEN DONE, <H> FOR HELP)

                    AK N   AK E   AK S
ENTER VALUES HERE:

Enter an estimate of the probability (0-100) that each of the EEI options will occur. Type your estimates on the line indicated by the "ENTER VALUES HERE" prompt; type at least one space after each estimate. You need not align each estimate under its appropriate headings; just enter it in order. Once all the estimates have been entered, press RETURN.

Next, CAPS prompts "ENTER REVISED ESTIMATES HERE" and gives you the opportunity to revise the values you just entered. To change any value, all of the estimates must be reentered even if only one needs to be revised. If the estimates are satisfactory and no revisions are necessary, simply press RETURN to exit.

<u>Relative worth of friendly to enemy actions</u>. When the EEI is submitted,
the commander anticipates taking action in response to acquired information.
With perfect tactical intelligence, the commander could deploy the friendly
forces to full advantage. The merit or worth of each possible friendly action
could be assessed and quantified relative to the actual enemy disposition, if
this were known. These estimates should account for factors such as overall
enemy strength, enemy to friendly force ratio, and difficulty of defending a
given sector, etc. CAPS prompts for estimates as follows:

GIVEN THE FOLLOWING ENEMY EEI OPTIONS, ENTER A VALUE
(0-100) THAT REPRESENTS THE RELATIVE WORTH OR MERIT
OF THESE POSSIBLE FRIENDLY OPTIONS:

PRESS <RETURN> WHEN DONE, <H> FOR HELP

	FRIENDLY CA OPTIONS		
	DF N	DF E	DF S
EEI OPTIONS			
1)AK N	0	0	0
2)AK E	0	0	0
3)AK S	0	0	0

ENTER VALUES FOR LINE 1 HERE:

Enter values between 0 and 100 that are estimates of the worth of each
friendly CA option against each associated enemy EEI option. The row values
need not sum to 100. Complete disaster is represented by a score of 0; com-
plete success is represented by 100. For example, how effective on a scale
of 0 to 100 would friendly CA option 1 be if the enemy pursued EEI option 1?
Friendly CA option 2? Friendly CA option 3?

When CAPS displays the prompt "ENTER VALUES FOR LINE 1 HERE," enter <u>all</u>
the values for the first row, in order, with a space after each; then press
RETURN. CAPs requests values for each successive line until all the values
have been entered.

When you have entered values for all lines, you have the opportunity to
revise incorrectly entered values. CAPS displays the prompt "TO CHANGE A
VALUE, ENTER THE ROW NO." If no revisions are required, exit by pressing
RETURN without first entering a number. Otherwise, enter the number of the
row in which the incorrect value appears. CAPS displays the current values
and then prompts, "ENTER THE REVISED VALUES HERE." Reenter <u>all</u> values for the
row, even if only one value needs to be changed, then press RETURN. When the
necessary revisions have been made, exit by pressing RETURN while CAPS is dis-
playing the prompt "TO CHANGE A VALUE, ENTER THE ROW NO."

Conditional probability of SIR options. The probabilities of the SIR options are considered to be contingent on the EEI options. It is necessary to estimate the probability that each SIR option would have existed prior to the occurrence of a given EEI option. The concern here is the probability of existence of the SIR option, not the probability of detection of that condition. (Limitations of the collection resources will be addressed later.) The display looks like this:

```
         FOR SIR (1):  ARE TROOPS IN VICINITY SCHWEINFURT,
            NA 885443?

         GIVEN THE FOLLOWING ENEMY EEI OPTIONS, WHAT IS THE
         PROBABILITY THAT EACH OF THE SIR OPTIONS LISTED
         BELOW WOULD BE OBSERVABLE?

         PRESS <RETURN> WHEN DONE, <H> FOR HELP

                         SIR OPTIONS
                         YES      NO
         EEI OPTIONS
         1)AK N           0        0
         2)AK E           0        0
         3)AK S           0        0

         ENTER VALUES FOR LINE 1 HERE:
```

Enter an estimate of the probability that each SIR option would have been observable given the occurrence of each enemy EEI option. In other words, if the enemy were attacking on the left (EEI option 1), how likely is it that troops would be in the vicinity Schweinfurt (SIR option 1)? How likely is it that they would not be in the vicinity Schweinfurt (SIR option 2)? The probabilities in each row must sum to 100.

Enter the conditional probabilities as follows: CAPS requests you to "ENTER VALUES FOR LINE 1 HERE," enter each value in order, followed by a space. Press RETURN after all values in the row are entered. CAPS prompts you for values for each successive row until all the values have been entered.

When all values have been entered, you can edit incorrect values. CAPS displays the prompt "TO CHANGE A VALUE, ENTER THE ROW NO." If no revisions are necessary, exit by pressing RETURN without first entering a number. Otherwise, enter the number of the row containing the error. CAPS then displays the current values and requests that you "ENTER THE REVISED VALUES HERE." Enter all of the values for that row even if only one value needs to be revised; then press RETURN. CAPS again displays the prompt "TO CHANGE A VALUE, ENTER THE ROW NO." If no further editing is required, exit by pressing RETURN without first entering a number.

CAPS displays each successive SIR for you to evaluate and estimate conditional probability values. Once you have entered all plan values, you can solve the plan by choosing option 5.

Plan Menu Option 4: Edit Plan Values

When you choose option 4, CAPS displays the following menu of values that you may want to edit:

    1) PRIOR PROBABILITIES OF EEI OPTIONS
    2) RELATIVE WORTH OF FRIENDLY TO ENEMY ACTIONS
    3) CONDITIONAL PROBABILITIES OF SIR OPTIONS GIVEN
       EEI OPTIONS
    4) RETURN TO PLAN MENU

Prior probability of EEI options. CAPS displays the current probability estimates. To edit, reenter all of the probability estimates, even if only one value is to be revised. Place a space after each value; press RETURN after all values have been entered. To exit, press RETURN.

Relative worth of friendly to enemy actions. CAPS displays the matrix of relative worth estimates. Enter the number of the line you want to edit, then reenter all the values for that line, making changes where appropriate. To exit, press RETURN while CAPS is displaying the prompt "TO CHANGE A VALUE, ENTER THE ROW NO."

Conditional probability of SIR options. In response to the prompt, "WHICH SIR DO YOU WISH TO REVIEW," enter the number of the SIR. When CAPS displays the SIR and matrix of values, enter the number of the line you want to edit and reenter all the probability estimates for that line, making revisions where appropriate. To exit, press RETURN while CAPS is displaying the prompt "TO CHANGE A VALUE, ENTER THE ROW NO." CAPS will return to the previous menu, where you can choose another matrix of values to edit or return to the PLAN MENU.

Plan Menu Option 5: Solve the Plan

   SIR priority. First, CAPS calculates and displays each SIR and its rela-
tive priority. Calculation of SIR priority is based on the numerical judgments
you made in the ENTER PLAN VALUES option. SIR priority expresses the relative
usefulness on a scale of 0 to 1 of the SIR in answering the EEI. The highest
priority SIR is assigned a value of 1; all others are assigned values propor-
tionate to it. A value of 0 indicates that answering this SIR will not in-
crease the certainty about enemy intentions. Press RETURN when you have fin-
ished examining these values.

   If the priority values do not appear consistent with your intuitive as-
sessment of SIR importance, press RETURN and choose HELP (option 2 in the next
frame) for information that will assist you in locating the source of the prob-
lem. Then return to the PLAN MENU (option 3) to edit the plan values.

   If the priority values are satisfactory, press RETURN to proceed to the
second phase of CAPS in which you assess collection resource capabilities and
solve for an allocation list.

   Assess Collection Resource Capabilities. The following four steps are
required in this assessment procedure.

   Step 1: Choose a list of collection resources (CRs). The list can be
one already stored on the disk or a new one that you create. The CR LIST MENU
provides the following options:

        1) CREATE NEW CR LIST
        2) LOAD CR LIST
        3) DELETE CR LIST
        4) SAVE CR LIST
        5) PRINT CURRENT LIST
        6) EXIT

   For a complete discussion of these options see the CR LIST MENU section.
Three of the options will be summarized here.

   To create a new list, choose option 1. You will be prompted to enter the
   CR code (maximum of four letters), the name of the CR (maximum of 19 let-
   ters placed directly under the "COLLECTION RESOURCE" prompt), and the com-
   pany, brigade, or divison responsible for providing this resource (maximum
   of 14 letters placed directly under the "CO/BRIG/DIV" prompt). A list can
   contain up to twenty CRs.

   To load an old list, choose option 2, enter the list number, and press
   RETURN.

   To exit the CR LIST MENU, choose option 6 (EXIT).

Step 2: CAPS asks whether you want a printout of the collection resource list. It is recommended that you obtain a printout to refer to when assessing collection resource capabilities.

Step 3: You can assess collection resource capabilities for only one SIR at a time. Therefore, you must choose one of the SIRs. CAPS displays a list of the SIRs from which to choose. Enter the SIR number and press RETURN.

Step 4: You can now assess the capability of collection resources for the SIR you chose. A collection resource could be considered an imperfect observer in the sense that the data gathered are not perfectly accurate or reliable. In addition to the intrinsic capability of the CR, other factors which affect its capability to gather information are weather, terrain, survivability, and morale. The display looks like this:

        SIR(1):   ARE TROOPS IN VICINITY SCHWEINFURT,
                  NA 885443?

        ENTER THE NUMBER OF THE COLLECTION RESOURCE, AND A VALUE
        (0-100) REPRESENTING ITS ABILITY TO COLLECT THE
        INFORMATION TO ANSWER THIS SIR.

        PRESS <RETURN> WHEN DONE, <H> FOR HELP

        CR   CAPABILITY

Under the "CR" prompt, enter the number of the collection resource. (Here is where the printout of collection resources is useful.) Enter under the "CAPABILITY" prompt an estimate of the capability (0-100) of that resource to collect information which will answer the SIR. An estimate of 100 indicates that the resource is capable of collecting the information 100% of the time.

After entering both the CR number and the capability, press RETURN. If you press RETURN after entering the CR number only, CAPS will ignore the entry. So that you can keep track of your assessments, the resources that you have already assessed are listed under the SIR.

To edit a collection resource, you need only reenter the number of the CR along with the revised value. CAPS will replace the old value with the new one.

To delete a CR, reenter the CR number, with a capability of zero.

To exit this SIR, press RETURN while CAPS is waiting for entry of a CR number. CAPS then returns to the SIR list so that you can choose another SIR. When you have completed resource assessment for all the SIRs, you can return to the ALLOCATION MENU by pressing RETURN while CAPS is displaying the list of SIRs.

Plan Menu Option 6:   Use the Diagnostic Package

The diagnostic package is a convenient way to check all of the entries you made in the prior probability, relative worth, and conditional probability matrices.   After choosing this option, CAPS presents the following menu:

1) DISPLAY MATRIX VALUES
2) RETURN TO PLAN MENU

Option 1 (Display matrix values) presents all the plan values that you entered.   Values can either be displayed on the monitor or printed, but not both simultaneously.   If the values are displayed on the monitor, scrolling of the screen can be halted by pressing "CTRL" (control) and "S" simultaneously. Scrolling is resumed by again pressing "CTRL" and "S."

In addition to your entries, values labeled UMAX (maximum utility) and UMIN (minimum utility) are displayed.   Both are derived from a matrix that results from the multiplication of the prior probability values and the relative worth values.   UMAX is the sum of the largest values in each row.   It is a measure of the advantage the friendly forces would have with perfect intelligence. UMIN is the largest column sum.   It is a measure of the single best friendly CA when no intelligence is available.   Comparison of these two values gives some indication of how much is to be gained by collecting the information for this plan.   If the two values are nearly equal, little is to be gained from this plan.

UMAX, UMIN, and another value, labeled U*, are used to calculate the relative priority of each SIR.   U* is the sum of the largest values in each row of a matrix which is derived by multiplication of the prior probability matrix, the relative worth matrix, and one of the conditional probability matrices. Nothing can be directly inferred from the value of U*; its only purpose is in the calculation of SIR priority.   The formula is:

SIR priority = (U* - UMIN)/(UMAX - UMIN)

When you have finished examining the matrices, press RETURN to return to the previous menu, then choose option 2 to return to the PLAN MENU.

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Allocation Menu

You gain access to the ALLOCATION MENU through the solve the plan option in the PLAN MENU. The ALLOCATION MENU provides the following options:

1) ASSESS COLLECTION RESOURCE CAPABILITIES
    2) EDIT COLLECTION RESOURCE CAPABILITIES
    3) REVIEW ASSIGNMENT OF SIRS TO COLLECTION
        RESOURCES
4) SOLVE FOR ALLOCATION LIST
    5) REVIEW ALLOCATION LIST
6) CR LIST MENU
7) RETURN TO PLAN MENU

These options are described in the following pages.

Allocation Menu Option 1:   Assess Collection Resource Capabilities

This option is fully described under the PLAN MENU option 5:   Solve the Plan (page 39).

Allocation Menu Option 2:   Edit Collection Resource Capabilities

First, CAPS displays a list of the SIRs. Enter the number of the SIR that you want to review.

Next, CAPS displays the SIR and the list of assessed CRs. To illustrate, refer to the display below in which the collection resources abbreviated by CI (counter intelligence), COLL (collection team), and so forth, were taken from a stored CR list called MYLIST.

> SIR(1):   ARE TROOPS IN VICINITY SCHWEINFURT,
>   NA 885443?

CR	CAP	CR	CAP	CR	CAP
1)CI	45	3)COLL	50	4)LRRP	25
9)LR	25	13)AO	60	19)FO	20

> PRESS <RETURN> WHEN DONE, <H> FOR HELP
>
> CR   CAPABILITY

When CAPS prompts you with "CR CAPABILITY," you can begin to edit collection resources by reentering the CR number, entering a space and the revised capability estimate (0-100), then pressing RETURN. CAPS will automatically replace the old value with the new one. To delete a CR, enter a capability value of zero.

Allocation Menu Option 3:   Review Assignment of SIRs to Collection Resources

First, CAPS asks which collection resources you want to see. Enter the number of one or more CRs (with a space between each entry) or "A" (all) if you want to see the entire list of CRs.

Next, CAPS asks whether you want a printout. Depending on your response, CAPS either prints or displays a list consisting of each collection resource, with the SIRs to which it has been assigned.

If the list is displayed on the monitor, you can stop the screen from scrolling by pressing the "CTRL" key and the letter "S" simultaneously. To resume scrolling, press "CTRL" and "S" again.

Allocation Menu Option 4:   Solve for Allocation List

First, CAPS asks whether you want a printout.   Next, CAPS either prints
or displays, depending on your response, a list consisting of each SIR and its
priority, followed by:

-the resources that have been assigned to it,

-the capability of each resource,

-the utility of each collection resource, and

-the cumulative percentage of the answer to each SIR that all of the
assessed CRs contribute.

The display looks like the following:

SIR(1):   ARE TROOPS IN VICINITY   PRIORITY: 75
          SCHWEINFURT, NA 885443?

```
CR         CAPABILITY            UTILITY
1)CI        40                    30
3)COLL      50                    38
9)LR        41                    31
```

The cumulative amount answered by the above CRs is 85.5%.

Utility represents the usefulness or value of the information that is
likely to be obtained by that CR.   Utility is determined by the priority of
the SIR and the capability of the CR.   Utility values range from 0 to 100.
The sum of the utilities across all the CRs is an index of the efficiency of
the entire collection plan.   Utility values will help you determine which CRs
to delete if the collection plan requires modification.

The cumulative percentage is based on the assumption that each CR col-
lects independent information.   This value will help you determine whether
enough CRs with the necessary capability have been assigned to the SIR to
achieve a high probability of answering it.

If the list is displayed on the screen, you can interrupt scrolling by
pressing the "CTRL" key and the letter "S" simultaneously.   To resume scroll-
ing, press "CTRL" and "S" again.

Allocation Menu Option 5:   Review Allocation List

  First, CAPS asks which SIRs you want to review.   You can enter the number of one or more SIRs (each separated by a space) or the letter "A" (all).

  Next, CAPS displays for each SIR the same information provided in the SOLVE FOR ALLOCATION LIST option.   This consists of:

   -the SIR,

   -the SIR priority value,

   -each collection resource assigned to the SIR,

   -the capability of each collection resource,

   -the utility of each collection resource, and

   -the cumulative amount answered by the collection resources, provided
    they collect independent information.

  See the previous section (SOLVE FOR ALLOCATION LIST) for more details about the displayed information.

Allocation Menu Option 6:   CR List Menu

The CR LIST MENU provides the following options:

    1) CREATE NEW CR LIST
    2) LOAD CR LIST
    3) DELETE CR LIST
    4) SAVE CR LIST
    5) PRINT CURRENT LIST
    6) EXIT

Create new CR list. CAPS displays the following prompt:

TO CREATE A NEW LIST OF COLLECTION RESOURCES ENTER THE
FOLLOWING INFORMATION.   (PRESS <RETURN> WHEN DONE.)

CODE   COLLECTION RESOURCE   CO/BRIG/DIV
1)

First, enter a code name for the resource (maximum of four letters).
Next, using the space bar, move the cursor until it is under the first let-
ter of the "COLLECTION RESOURCE" prompt and enter the full name of the re-
source (19 letter maximum). Then move the cursor until it is under the first
letter of the "CO/BRIG/DIV" prompt and enter the name of the company, brigade,
battalion, or division responsible for providing this resource (14 letter
maximum). After entering information under all three prompts, press RETURN.
CAPS automatically displays the next number, e.g., "2)." You can enter a
maximum of twenty resources. When you are finished, exit by pressing RETURN
while CAPS is waiting for entry of another code name.

Load CR list. CAPS displays the available CR lists. Enter the number of
the list that you want to load. CAPS confirms that the list has been loaded
and returns to the CR LIST MENU.

Delete CR list. CAPS displays the available CR lists. Enter the name of
the list that you want to delete. CAPS deletes the CR list and returns to the
CR LIST MENU.

Save CR list. CAPS displays the available CR lists. Enter the name of
the new list. If there is a vacant slot, the new CR list will be saved. If
all the slots are full, you must first return to the CR LIST MENU and delete
one of the lists, then choose the SAVE CR LIST option again and save the list.
If you press RETURN without entering a name, CAPS saves the CR list under the
name "SYSTEM.MODEL."

Print current list. CAPS first asks you to confirm that you want a print-
out of the CR list. If you respond "N," CAPS returns to the CR LIST MENU. If
you respond "Y," CAPS advises you to adjust the printer if necessary and press
RETURN to initiate printing. After the list is printed, press RETURN to return
to the CR LIST MENU.